

## ORIGINAL ARTICLE

# Coupling Longitudinal Data and Multilevel Modeling to Examine the Antecedents and Consequences of Jealousy Experiences in Romantic Relationships: A Test of the Relational Turbulence Model

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*We used longitudinal data and multilevel modeling to examine how intimacy, relational uncertainty, and failed attempts at interdependence influence emotional, cognitive, and communicative responses to romantic jealousy, and how those experiences shape subsequent relationship characteristics. The relational turbulence model (Solomon & Knobloch, 2004) highlights how intimacy, relational uncertainty, and interference from partners influence and reflect reactions to events that occur within romantic relationships. Drawing from the theory, we predicted that (a) relational uncertainty and interference from partners are positively associated with cognitive and emotional jealousies; (b) the intensity of romantic jealousy, relational intimacy, and a partner's interference is positively associated with the directness of communication about jealousy; (c) relational uncertainty is negatively associated with communicative directness; and (d) cognitive jealousy, emotional jealousy, and the directness of communicative responses to jealousy influence subsequent relationship characteristics. The results of the multilevel modeling revealed mixed support for our predictions. We explore the implications of this study for research on the relational turbulence model, relationship development, and jealousy.*

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Communication scholars assume that qualities of interpersonal associations shape both the messages people enact and the meaning they attach to a partner's communication behaviors (e.g., Planalp, 1985). In turn, specific communication experiences inform and update a person's conception of his/her relationship (e.g., Duck, 1995;

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Wish, Deutsch, & Kaplan, 1976). Although the mutual correspondence between relationship qualities and communication experiences is widely accepted, capturing this process empirically is less straightforward. Numerous studies have examined communication behaviors as a consequence of relationship characteristics (e.g., Goldsmith & Baxter, 1996; Guerrero, 1997; Knobloch & Solomon, 2003). Likewise, the relational inferences that people derive from their interactions have been the subject of ample research (e.g., Burgoon & Hale, 1987; Dillard, Solomon, & Samp, 1996). Our goal in this study was to feature multilevel modeling as a means of illuminating the reciprocal links between global relationship qualities and specific relationship experiences.

We draw our theoretical foundation from Solomon and Knobloch's (2004) relational turbulence model, which was founded on the observation that various experiences are more pronounced at moderate levels of intimacy in dating relationships (e.g., emotional reactivity—Aune, Aune, & Buller, 1994; aggression—Billingham & Sack, 1987; indirectness—Solomon, 1997; displays of intimacy—Emmers & Dindia, 1995). By considering the challenges that surface during the transition from casual to serious dating, Solomon and Knobloch (2001) nominated uncertainty about the relationship and goal interference within new domains of interdependence as the mechanisms underlying these trends. Consistent with this view, empirical evidence suggests that these mechanisms promote more extreme reactions to a variety of relationship phenomena (e.g., appraisals of irritations—Solomon & Knobloch, 2004 and Theiss & Solomon, 2006b; jealousy—Knobloch, Solomon, & Cruz, 2001; sexual intimacy—Theiss, 2005; topic avoidance—Knobloch & Carpenter-Theune, 2004). In other work (Theiss & Solomon, 2006a), we address the extent to which relational uncertainty and interference from partners follow a curvilinear trajectory associated with developing intimacy. In this study, we narrow our focus to investigate how relationship qualities both shape and reflect experiences of specific relational episodes.<sup>1</sup>

Whereas research noted previously has linked relationship qualities with reactions to various relational phenomena, these results are qualified by two important limitations. First, the empirical base is restricted to cross-sectional studies that have evaluated how differences in relationship qualities between persons correspond with perceptions of specific circumstances (e.g., Knobloch & Carpenter-Theune, 2004; Solomon & Knobloch, 2001, 2004). Second, studies to date have not examined how communication about particular issues shapes people's more general perceptions of their relationship. We address these shortcomings using a longitudinal research design coupled with multilevel modeling techniques to evaluate how the relationship characteristics highlighted by the relational turbulence model correspond with reactions to a specific relationship issue and in turn, how communication about that issue influences subsequent perceptions of the relationship.

The relational turbulence model suggests that relationship characteristics can amplify reactions to a variety of phenomena, but we focus this investigation on the experience of romantic jealousy. Jealousy within romantic associations can elicit

an array of intense emotional, cognitive, and communicative responses (Bevan, 2004; Knobloch et al., 2001; Pfeiffer & Wong, 1989; White & Mullen, 1989). Moreover, the management of romantic jealousy through communication has been linked to relationship outcomes, including satisfaction, stability, and uncertainty (e.g., Bevan, 2004; Guerrero & Andersen, 1998). Hence, romantic jealousy provides a context within which we might observe the mutual correspondence between global relationship qualities and a particular experience. To begin, we review the mechanisms featured by Solomon and Knobloch's (2004) relational turbulence model. Then, we explicate the experience of jealousy and highlight the emotional, cognitive, and communicative facets of this event. Next, we advance hypotheses linking relationship qualities with the intensity of jealousy and the directness of communication about it. Finally, we discuss the reciprocal effect of jealousy and communicative directness on relationship characteristics.

### Core mechanisms in the relational turbulence model

Turbulence arises in relationships when circumstances inherent to the development of intimate associations generate arousal and heightened reactivity to relationship conditions. The reactivity that individuals experience is manifested as a constellation of polarized emotions, cognitions, and communicative behaviors. Although the potential for turmoil is always present in relationships, Solomon and Knobloch (2001) argued that reactivity to specific events is shaped by the extent to which individuals are uncertain about the association or experience goal interference from partners. In the following paragraphs, we define these mechanisms and describe their associations with emotional, cognitive, and communicative reactions to relationship events.

Relational uncertainty refers to a person's confidence in his/her perceptions of relationship involvement. Relational uncertainty encompasses three interrelated sources of ambiguity: *self uncertainty* stems from doubts about one's own feelings of relationship; *partner uncertainty* refers to doubts about a partner's involvement in the relationship; and *relationship uncertainty* involves questions about the relationship more generally (Berger & Bradac, 1982; Knobloch & Solomon, 1999, 2002a). The experience of uncertainty has been linked to more extreme emotional states in relationships (Planalp & Honeycutt, 1985; Planalp, Rutherford, & Honeycutt, 1988). Relational uncertainty also corresponds to polarized cognitions about the self and the partner (e.g., Planalp & Honeycutt) and more negative appraisals of relational irritations (Solomon & Knobloch, 2004; Theiss & Solomon, 2006b). In addition, doubts about romantic involvement are associated with more extreme communication patterns, including a tendency to be both more direct (e.g., Afifi, Dillow, & Morse, 2004; Afifi & Weiner, 2004; Planalp & Honeycutt) and indirect (e.g., Knobloch & Carpenter-Theune, 2004; Planalp & Honeycutt; Planalp et al., 1988; Theiss & Solomon, 2006b). Thus, a sizable body of research suggests that relational uncertainty magnifies the intensity of particular relationship events.

Solomon and Knobloch (2001, 2004) proposed that a partner's interference in everyday activities is another mechanism associated with turbulence in romantic relationships. Berscheid (1983) suggested that relationships develop as each partner's activities become contingent upon the other's participation. Consider the example of Jack and Jill, who are romantically interested in each other. As the relationship commences, Jack and Jill begin involving each other in their everyday activities: Jill gets a ride to work with Jack; Jack moves his workout to the early evening so that he and Jill can exercise together; and the couple start having dinner together frequently. Initially, these attempts at interdependence are likely to be disruptive: Jack has to run an errand in the morning, which makes Jill late; Jill works late to make up for it, so Jack misses his workout; and the couple cannot agree on a restaurant for dinner. With feedback and practice, Jack and Jill learn how to coordinate their behaviors in ways that would enhance, rather than disrupt, their routines: Jack picks Jill up earlier so that they can get coffee together; Jill adjusts her work schedule so that she and Jack can exercise together; and the couple find several new restaurants they both like. As this example illustrates, initial efforts at integrating routines are often disruptive because partners involve each other in activities, but they are yet to learn how to facilitate each other's outcomes. Interference from partners, then, refers to the extent to which a partner disrupts goals and routines. Although few studies have examined the consequences of interference from relational partners, Berscheid argued that disruption to previously fluid action sequences leads to emotional arousal. More generally, theoretical reasoning and empirical evidence imply that interference gives rise to the intensified emotions (e.g., Le & Agnew, 2001; Rusbult & Van Lange, 1996), cognitions (Sillars, Roberts, Leonard, & Dun, 2000), and communication (e.g., Theiss & Solomon, 2006b) that define relational turbulence.

To review, the relational turbulence model positions relational uncertainty and interference from partners as mechanisms tied to developing intimacy that shape reactions to specific relationship events. More specifically, relational uncertainty and a partner's interference are argued to polarize the emotions, cognitions, and communication behaviors elicited by issues that arise within romantic associations. In the following section, we explore romantic jealousy as one phenomenon subject to the effects of relational uncertainty and a partner's interference.

### **Jealousy as a manifestation of relational turbulence**

Jealousy stems primarily from the perception of romantic involvement between one's partner and a real or an imaginary rival (e.g., White & Mullen, 1989). More specifically, jealousy is defined as a multidimensional experience involving cognition, emotion, and communication (Pfeiffer & Wong, 1989; White, 1981). In this section, we discuss the ways in which qualities of the relationship influence cognitive and emotional jealousies and the directness of communication about it.

### **Predicting the intensity of cognitive and emotional jealousies**

The experience of jealousy in romantic relationships takes two forms: cognitive jealousy and emotional jealousy (Pfeiffer & Wong, 1989; White & Mullen, 1989). *Cognitive jealousy* involves a person's worries, doubts, and suspicions about a partner's potential infidelity or external relationships. *Emotional jealousy* constitutes an affective reaction to a real or an imagined threat to a valued relationship. This emotional arousal encompasses negative feelings of anxiety, discomfort, anger, fear, insecurity, and upset (Guerrero, Eloy, Jorgensen, & Andersen, 1993; Sharpsteen, 1993; Sharpsteen & Kirkpatrick, 1997), as well as positive emotions like love (White & Mullen).

The relational turbulence model nominates relational uncertainty as a mechanism that should heighten the experience of jealousy. Afifi and Reichert (1996) found that relationship circumstances that provoke jealousy are marked by high levels of uncertainty about the definition of the relationship (see also Guerrero & Andersen, 1998). Similarly, Knobloch et al. (2001) observed that cognitive jealousy was positively associated with relational uncertainty. Because relational uncertainty calls into question the stability of the relationship (Bush, Bush, & Jennings, 1988; Melamed, 1991) and causes confusion about potential threats to the relationship (Guerrero & Andersen), it creates a context in which potential rivals are perceived as more threatening and emotionally upsetting. Thus, relational uncertainty makes people vulnerable to suspicion about a partner's fidelity. This well-established association between relational uncertainty and jealousy is reflected in the following hypothesis:

H1: Relational uncertainty is positively associated with cognitive and emotional jealousies.

Goal disruptions and failed attempts at interdependence also create a context that intensifies jealousy. As partners become more interdependent, normative rules dictate that third party relations are inappropriate (Aune & Comstock, 1997). Although relinquishing autonomy is required to establish interdependence, it also allows partners to disrupt previously fluid behavioral sequences (Berscheid, 1983). Moreover, the heightened goal interference during periods of growing interdependence is likely to make people less tolerant of new problems in the relationship (cf. Berkowitz, 1969). The frustrations that arise as a result of this loss of autonomy and corresponding interruptions should make people particularly reactive to potential rivals who impede the development of an interdependent social unit. Accordingly, we propose that interference from a partner corresponds with increased cognitive and emotional jealousies.

H2: A partner's interference is positively associated with cognitive and emotional jealousies.

### **Predicting the directness of communication about jealousy**

Whereas the previous section focused exclusively on relational uncertainty and a partner's interference as forces that shape cognitive and emotional jealousies, we

have reason to think that a broader array of factors affect how people communicate about romantic jealousy. Although there are a variety of communication strategies used to express and manage jealousy (Guerrero, Andersen, Jorgensen, Spitzberg, & Eloy, 1995), the directness of jealousy expression is particularly relevant to personal (Bryson, 1977) and relational (Guerrero & Afifi, 1998; Rusbult & Buunk, 1993) consequences. Moreover, six categories of communicative responses to jealousy identified by Guerrero et al. (1995) represent various degrees of direct jealousy expression. In particular, direct strategies for addressing jealousy can involve integrative communication, negative affect expression, violent communication, or threats. Conversely, indirect strategies encompass active distancing, avoidance, and denial of jealousy. In this section, we first examine how the intensity of jealousy and the intimacy of a relationship correspond with the directness of communication about a jealousy experience. We then consider the roles that relational uncertainty and interference from partners play in communicative responses to jealousy.

One factor that should influence communicative directness in this context is the severity of the relational threat posed by a potential rival. Although previous research suggests that particularly severe problems in relationships call for direct communication to resolve the issue (e.g., Fincham, Bradbury, & Grych, 1990; Newell & Stutman, 1991; Roloff & Solomon, 2002), confronting a partner about jealousy can be a more delicate matter. Because the perceived rival offers the partner an alternative to the relationship, that partner has more power to leave the relationship and may be less likely to tolerate jealous confrontations (cf. Roloff & Cloven, 1990). At the same time, jealousy experiences that are less intense might be easier to discount and withhold in order to preserve relational harmony (cf. Solomon & Samp, 1998). The trade-off, then, is between the magnitude of the exigence posed by jealousy and the concerns about the consequences of direct communication. Prior research suggests that jealous individuals use communication to reduce uncertainty about the circumstances that provoke jealousy (Afifi & Reichert, 1996; Guerrero & Afifi, 1998) and to strengthen the primary relationship (Guerrero & Afifi, 1998; Rusbult & Buunk, 1993). Although tentative, this reasoning suggests that more intense jealousy experiences promote more direct communication.

H3: Cognitive and emotional jealousies are positively associated with the directness of communication about experiences of jealousy.

The intimacy of the relationship in which jealousy arises should also shape communicative responses. Intimacy in romantic relationships is associated with withholding fewer complaints (e.g., Cloven & Roloff, 1994; Knobloch & Carpenter-Theune, 2004), engaging in more arguments (e.g., Braiker & Kelley, 1979; Christopher & Cate, 1984), demonstrating more verbal aggression (Billingham & Sack, 1987), and openly discussing sexual desires (e.g., Simon & Gagnon, 1986). With regards to jealousy in particular, Aune and Comstock (1997) found that the

expression of jealousy and its perceived appropriateness increased across levels of relationship development.<sup>2</sup> Accordingly:

H4: Intimacy is positively associated with the directness of communication about experiences of jealousy.

Beyond the effects of jealousy intensity and relational intimacy, the relational turbulence model positions relational uncertainty and interference from partners as forces that shape the directness of communication about relationship events. Prior research has shown that partners are less motivated to express jealous feelings when relational uncertainty is high (Afifi & Reichert, 1996). Furthermore, Guerrero and Afifi (1998, 1999) found that individuals are more likely to engage in active distancing from the partner or denial of jealousy under conditions of relational uncertainty. These general effects are likely to hold for the specific sources of relational uncertainty as well. People who are uncertain about their own involvement in the relationship have not yet resolved their own commitment to the association; therefore, explicit conversations that risk either driving the partner away (Bevan, 2004) or making relational commitments concrete (cf. Knobloch & Solomon, 2002a) would be ill-timed. Likewise, when individuals have doubts about their partner's commitment to the relationship, they are likely to withhold complaints and suspicions about a potential rival (cf. Cloven & Roloff, 1994). Under conditions of relationship uncertainty, people cannot confidently predict the consequences their actions will produce; therefore, they resort to more indirect communication in order to save face and determine an appropriate course of action (cf. Knobloch & Solomon, 2002a). The following hypothesis reflects the inverse association that is expected between the sources of relational uncertainty and the communicative directness:

H5: Self, partner, and relationship uncertainty are negatively associated with the directness of communication about jealousy.

In contrast to H5, we expect that interference from partners is positively correlated with directness. To the extent that a partner's interference gives rise to more intense emotional and cognitive jealousies (H2) and the intensity of jealousy experiences promotes communicative directness (H3), we should observe a positive association between interference from partners and directness. Moreover, the experience of obstacles to desired objectives might intensify people's goal-directed behavior (Ifert & Roloff, 1996, 1998; Paulson & Roloff, 1997), producing a direct link between a partner's interference and communicative directness. Thus, we advance the following hypothesis:

H6: A partner's interference is positively associated with the directness of communication about jealousy.

### The consequences of jealousy and communicative directness for relationship development

A developmental perspective on romantic relationships acknowledges that certain experiences alter the association in ways that impact the context for future relational episodes. Duck (1995) argued that relationships are socially constructed and are constantly in the process of being created. Moreover, relationship maintenance is accomplished through the daily interactions between partners (Baxter & Montgomery, 1996; Masuda & Duck, 2002). In this section, we consider how jealousy has repercussions for developing intimacy, managing relational uncertainty, and establishing interdependence.

In some instances, prior research has shown that individuals may try to induce jealousy in order to achieve positive relational outcomes, such as clarifying commitment and attraction to the partner (Sheets, Fredendall, & Claypool, 1997), increasing feelings of love (White & Mullen, 1989), and promoting stability (Sheets et al., 1997). From the perspective of a jealous partner, however, intense experiences of jealousy can have negative consequences for the relationship. Mullen and Martin (1994) found that jealous men were concerned about the potential loss of their romantic partner and jealous women worried about the quality of the relationship. Jealous feelings can also give rise to increased possessiveness, manipulation, and relationship threat (e.g., Carson & Cupach, 2000), and it can prompt communication episodes marked by possessiveness, distancing, or violence (Guerrero et al., 1995). In light of this research, we predict that more intense cognitive and emotional jealousies undermine intimacy and increase both relational uncertainty and perceptions of interference from partners. Specifically:

H7: Cognitive and emotional jealousies are negatively associated with intimacy and positively associated with relational uncertainty and a partner's interference following the experience.

The directness of communication about relationship events is a driving force behind the development of intimacy in relationships. Communication fosters closeness because it reduces uncertainty about the association (e.g., Berger & Calabrese, 1975) and reveals private information that builds trust (Altman & Taylor, 1973). Knobloch and Solomon (2002a) argued that the very process of reducing uncertainty through communication creates a sense of accomplishment, promotes self-efficacy, and bolsters togetherness. Similarly, communication is vital for the negotiation of interdependence because it helps coordinate action sequences between partners (e.g., Rusbult & Van Lange, 2003). More generally, Canary and Cupach (1988) found that integrative communication strategies for conflict management correspond to increased trust, intimacy, and satisfaction. Thus, the directness of communication about relational challenges provides an opportunity to strengthen a relationship.

The general effect of communication on relationship outcomes may be particularly pronounced when relational partners experience jealousy. A decision



to withhold jealous feelings can lead to rumination, which promotes negative behaviors like possessiveness, manipulation, and violence (Carson & Cupach, 2000). Although some research has shown that expressions of jealousy lead to increased uncertainty for the other partner (Bevan, 2004), communication about jealousy is generally associated with relationship maintenance, increased self-esteem, and reduced uncertainty about the primary and rival relationships (Guerrero & Afifi, 1999). Taken together, this evidence suggests the following hypothesis:

H8: The directness of communication about jealousy is positively associated with intimacy and negatively associated with relational uncertainty and a partner's interference following the experience.

## Method

To test our hypotheses, we conducted a longitudinal Web-based survey that assessed characteristics of ongoing romantic relationships, reactions to experiences of jealousy, and the directness of communication about these events. Students in communication classes at a large university in the Midwestern United States were given a small amount of extra credit for their participation in a study in which they completed six weekly questionnaires about a current romantic relationship. Testing the relational turbulence model required a sample spanning the full spectrum of intimacy; therefore, we used an inclusive definition of dating relationships when soliciting participants. Specifically, we recruited individuals who had a romantic interest in another person with whom they had previously interacted and with whom they anticipated future interaction.<sup>3</sup>

## Sample

In this study, 295 undergraduate students responded (82 men and 212 women; one person provided no response). Participants ranged in age from 18 to 30 years, with a mean age of 20.72 years. The majority of the sample were White/Caucasian (89.8%), with an additional 7.3% Asian, 2.2% Hispanic, 0.6% Native American, 0.6% Black, and 0.3% others. Of the current relationship partners, 208 were men and 83 women (four provided no response). Partners ranged in age from 17 to 43 years, with a mean age of 22.79 years. When asked to characterize the status of their relationship during the first week of the study, 5.1% participants reported that they were acquaintances, 21.7% reported that they were friends, 22.7% reported that they were causally dating, 46.6% reported that they were seriously dating, 2.6% reported that they were engaged, and 1.3% reported that they were married. Engaged and married individuals were excluded from the analyses because they were beyond the trajectory of relationship development addressed by our hypotheses. The remaining pool of respondents reported on relationships that ranged in length from 0 to 72 months ( $M = 13.82$  months).

### Procedures

Weekly questionnaires were administered through an Internet Web site. Students interested in participating in the study provided contact information and were later e-mailed using an individual username and password to access the first survey. During subsequent weeks, the participants were e-mailed a new password to access the next phase of the study. After completing the questionnaire each week, responses were submitted online and data stored on a secure server. Usernames and passwords were not included in the data file to ensure anonymity for respondents. Participants were instructed to attempt to complete their questionnaires at roughly the same time each week to ensure that enough time had elapsed to capture changes in relationship characteristics. Across all weeks of the study, 68.7% of the questionnaires were submitted within 5–9 days of the submission in the previous week. In addition, 16.6% of the questionnaires were submitted within 1–4 days of the previous submission and 14.7% submitted within 10–12 days of the previous submission.

During the first week, participants provided demographic information about themselves and their partners and completed closed-ended scales to report their perceptions of intimacy, relational uncertainty, interference from the partner, jealousy, and the directness of communication about their jealousy. Questionnaires during subsequent weeks asked participants to provide an open-ended account of relationship events during the past 7 days, and they included all the same measures of intimacy, relational uncertainty, a partner's interference, jealousy, and communication that were in the baseline questionnaire. Respondents were instructed to answer questions during Weeks 2–6 based on events and characteristics of their relationship over the course of the past week.

### Measures

A variety of closed-ended Likert-type scales were used to operationalize variables in the study. Confirmatory factor analyses were conducted on all multi-item scales to ensure that they met the criteria of face validity, internal consistency, and parallelism (Hunter & Gerbing, 1982). Composite scores were constructed by averaging responses to the individual items. Table 1 summarizes descriptive statistics for each measure in each week of the study.

#### *Intimacy*

Consistent with Solomon and Knobloch's (2004) previous test of the relational turbulence model, we operationalized intimacy through a composite measure that incorporated indicators of intimacy associated with developmental patterns (cf. Cloven & Roloff, 1994; Solomon, 1997; Solomon & Knobloch, 2004). This strategy resulted in an inclusive and parsimonious indicator that assessed multiple aspects of intimacy that are implicated in developmental processes.

One component of the composite measure was Rubin's (1970) Love Scale. Although the name of the scale implies a narrow focus on love, this measure actually assesses three important components of intimacy: feelings of affiliative need,

**Table 1** Weekly Descriptive Statistics for All Variables

	Week 1, N = 295	Week 2, N = 279	Week 3, N = 278	Week 4, N = 284	Week 5, N = 277	Week 6, N = 282
Intimacy						
Love	5.80 (1.77)	5.41 (1.54)	5.17 (1.71)	5.23 (1.84)	5.14 (1.92)	5.10 (2.01)
Commitment	4.66 (1.26)	4.65 (1.26)	4.50 (1.39)	4.41 (1.50)	4.31 (1.56)	4.35 (1.60)
Chance of lifelong commitment	45.58 (31.56)	44.45 (31.97)	44.14 (32.04)	44.20 (32.01)	41.92 (33.36)	41.95 (33.65)
Self uncertainty	2.34 (1.06)	2.36 (1.10)	2.37 (1.18)	2.40 (1.24)	2.40 (1.26)	2.34 (1.30)
Partner uncertainty	2.69 (1.34)	2.70 (1.39)	2.65 (1.37)	2.59 (1.37)	2.70 (1.48)	2.57 (1.44)
Relationship uncertainty	2.58 (1.16)	2.56 (1.17)	2.50 (1.18)	2.47 (1.25)	2.54 (1.25)	2.47 (1.30)
Interference from partners	2.60 (1.07)	2.61 (1.21)	2.57 (1.24)	2.51 (1.24)	2.54 (1.21)	2.41 (1.26)
Cognitive jealousy	2.32 (1.38)	2.26 (1.45)	2.30 (1.53)	2.30 (1.59)	2.37 (1.70)	2.31 (1.68)
Emotional jealousy	3.40 (1.35)	3.20 (1.45)	3.07 (1.43)	3.03 (1.52)	3.05 (1.55)	2.88 (1.52)
Communicative directness	3.49 (1.57)	2.83 (1.61)	3.13 (1.56)	3.14 (1.59)	3.27 (1.63)	3.26 (1.63)

Note: Values are given as mean (SD). N represents the sample size at each week.

willingness to help, and exclusiveness toward a partner. Respondents used a Likert scale (1 = *not at all true*, 9 = *definitely true*) to indicate their responses to the nine items in the measure (CFI = .99, RMSEA = .04,  $\alpha$  = .93).

Commitment to continuing the association comprised the second component of the composite intimacy variable. Participants responded on a 6-point Likert scale (1 = *strongly disagree*, 6 = *strongly agree*) to indicate their agreement with four statements (e.g., I am very committed to maintaining this relationship; CFI = .99, RMSEA = .08,  $\alpha$  = .92).

A third aspect of the composite intimacy variable encompassed the probability that the relationship would continue to progress toward lifelong commitment. Participants were presented with the question, "At this point in time, what do you feel the chance is of your relationship leading to marriage or a similar monogamous commitment?" Then, they indicated their perception of the likelihood of this outcome by circling a response from 0% to 100% on a scale that provided 5% increments.

Bivariate correlations indicated sizable overlap between love and commitment ( $r = .79, p < .001$ ), between love and likelihood of marriage or serious commitment ( $r = .72, p < .001$ ), and between commitment and likelihood of marriage or serious commitment ( $r = .71, p < .001$ ). Thus, the measures of love, commitment, and likelihood of marriage were converted to z scores, which were averaged to form a composite measure (range =  $-2.28$  to  $-1.48$ ,  $SD = 0.89$ ). Coefficient alpha for the composite scale was .90.

#### *Relational uncertainty*

We used measures developed by Knobloch and Solomon (1999) to assess relational uncertainty. Respondents were presented with a stem that read "How certain are you about . . .," followed by a series of statements. Participants used a 6-point Likert scale (1 = *completely or almost completely uncertain*, 6 = *completely or almost completely certain*) to rate their certainty with each of the statements. Responses to all items were reverse scored to compute measures of relational uncertainty. Consistent with Knobloch and Solomon's previous operationalization of this scale, unidimensional subscales were identified for self, partner, and relationship uncertainty. The self uncertainty subscale comprised six items (e.g., whether or not you want the relationship to work out in the long run; CFI = .98, RMSEA = .05,  $\alpha$  = .92). The partner uncertainty subscale also consisted of six items (e.g., whether or not your partner is ready to commit to you; CFI = 1.0, RMSEA = .03,  $\alpha$  = .95). The relationship uncertainty subscale included eight items (e.g., whether or not the relationship will work out in the long run; CFI = .99, RMSEA = .03,  $\alpha$  = .94).

#### *Partner's interference*

We also used a measure of partner's interference similar to that used by Solomon and Knobloch (2001, 2004). Consistent with the conception of interference offered previously, this measure focuses on the extent to which a partner disrupts everyday goals and activities. Respondents were asked to indicate on a 6-point Likert scale

(1 = *strongly disagree*, 6 = *strongly agree*) the degree to which their partners interfered with everyday activities. Three items formed a unidimensional measure of partner's interference (e.g., This person interferes with the things I need to do each day; CFI = 1.0, RMSEA = .00,  $\alpha = .81$ ).

### *Jealousy*

Cognitive and emotional jealousies were measured using items from Pfeiffer and Wong's (1989) Multidimensional Jealousy Scale (see also Knobloch et al., 2001). Participants used a 7-point Likert scale (1 = *never*, 7 = *always*) to indicate the extent to which they felt jealous in their relationship. Four items comprised a unidimensional measure of cognitive jealousy (e.g., I suspect my partner is seeing someone else; CFI = .97, RMSEA = .05,  $\alpha = .90$ ). Four items provided a measure of emotional jealousy (e.g., I would have felt jealous if my partner flirted with someone else; CFI = .96, RMSEA = .07,  $\alpha = .82$ ).

### *Directness of communication*

Using a 6-point Likert scale (1 = *strongly disagree*, 6 = *strongly agree*), participants also recorded their agreement with a series of statements characterizing the directness of their communication about their jealousy. Two items measured directness of communication about jealousy: (a) I openly tell my partner when I am feeling jealous and (b) when I feel jealous I tell my partner how I am feeling ( $\alpha = .78$ ).<sup>4</sup>

### *Time*

We quantified the passage of time during the study in weeks, where the baseline week of the study was quantified Week 0 and the remaining weeks quantified Weeks 1–5, for a total of 6 weeks.

## **Analyses**

### **Preliminary analyses**

As a starting point, we examined data gathered by the baseline questionnaire at Week 1. First, we conducted independent sample *t* tests to evaluate each of the variables for sex differences. The results revealed no significant differences between men and women on any of the variables in this study. We also assessed the correlations among all the variables (Table 2). Results indicated that intimacy was negatively associated with all three facets of relational uncertainty, positively associated with interference from a partner, negatively associated with cognitive jealousy, positively associated with emotional jealousy, and positively associated with communicative directness. In addition, self, partner, and relationship uncertainty were all positively correlated and shared a negative association with a partner's interference, a positive association with cognitive jealousy, and a negative association with communicative directness. Interference from partners was positively associated with emotional jealousy and communicative directness. Cognitive and emotional jealousies were positively correlated. Finally, cognitive jealousy was negatively associated

**Table 2** Correlations Among Relationship Characteristics, Jealousy, and Communicative Directness at Week 1

	1	2	3	4	5	6	7	8
Intimacy	—							
Self uncertainty	-.69***	—						
Partner uncertainty	-.63***	.65***	—					
Relationship uncertainty	-.70***	.75***	.86***	—				
Interference	.24***	-.15*	-.25***	-.20***	—			
Cognitive jealousy	-.48***	.38***	.51***	.55***	-.05	—		
Emotional jealousy	.12*	-.07	.02	.03	.23***	.25***	—	
Communicative directness	.57***	-.45***	-.53***	-.51***	.28***	-.35***	.03	—

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

with communicative directness, but emotional jealousy did not share a significant correlation with directness.

We also calculated the intraclass correlation ( $\rho$ ) for each of the dependent variables. With longitudinal data, the intraclass correlation calculates the proportion of total variation in the outcome variable that is attributed to between-person, as opposed to within-person, variance. An intraclass correlation that is close to 0 indicates that the variability in the dependent variable is attributable mostly to within-person variance, and a correlation that is close to 1 suggests that most of the variance is between persons (Kreft & De Leeuw, 1998; Snijders & Bosker, 1993). The majority of the variability in the dependent variables in this study were attributable to between-person variation (cognitive jealousy— $\rho = .76$ ; emotional jealousy— $\rho = .78$ ; communicative directness— $\rho = .54$ ; intimacy— $\rho = .82$ ; self uncertainty— $\rho = .55$ ; partner uncertainty— $\rho = .70$ ; relationship uncertainty— $\rho = .64$ ; interference from partners— $\rho = .57$ ).

### Substantive analyses

The longitudinal analyses focused on how within-person changes in relationship characteristics from week to week corresponded with reactivity to jealousy and, in turn, how jealousy and communicative directness shaped subsequent intimacy, relational uncertainty, and interference from partners. The data were analyzed using multilevel modeling (Bryk & Raudenbush, 1992), estimated with Hierarchical Linear Modelling (HLM) software version 6.0. The multiple observations across weeks are nested within the individual, and relationship change was represented through a two-level model using maximum likelihood estimation, with time-varying predictors at Level 1 and stable person or relationship characteristics at Level 2. Thus, the models provide insight to the structure and predictors of individual change (Raudenbush & Bryk, 2002). In the models that follow, the subscript  $i$  refers to the time of measurement (Level 1) and the subscript  $j$  refers to the respondent (Level 2).

*Hypotheses 1–6*

Two sets of analyses were required to assess predictors of cognitive and emotional jealousies and the directness of communication about those events. First, we used multilevel modeling to examine the associations between mechanisms in the relational turbulence model and the cognitive and emotional reactions to jealousy. Cognitive and emotional jealousies were treated as the dependent variables in separate analyses, in which the time-varying Level 1 predictors were the sources of relational uncertainty and a partner’s interference. We also included intimacy as a Level 1 covariate in the model because our preliminary analyses indicated that it was correlated with both cognitive and emotional jealousies.<sup>5</sup> A second analysis treated communicative directness as the dependent variable and evaluated cognitive and emotional jealousies, intimacy, relational uncertainty, and partner interference as time-varying Level 1 predictors.

All the models started with intimacy as a predictor, controlling for time. Because respondents started the study at different points along the relationship trajectory, we also included their baseline relationship status as a covariate. Thus, the baseline models predicting cognitive and emotional jealousies and the directness of communication about jealousy were as follows:

Model 1: Baseline model

Level 1 equation:

$$Y_{ij} = \pi_{0j} + \pi_{1j}(\text{time}_{ij} - \overline{\text{time}}_j) + \pi_{2j}(\text{status}_{1j}) + \pi_{3j}(\text{intimacy}_{ij} - \overline{\text{intimacy}}_j) + r_{ij}$$

Level 2 equation:

$$\begin{aligned} \pi_{0j} &= \beta_{00} + \beta_{01}(\overline{\text{intimacy}}_j) + u_{0j} \\ \pi_{1j} &= \beta_{10} + u_{1j} \\ \pi_{2j} &= \beta_{20} \\ \pi_{3j} &= \beta_{30} + u_{3j} \end{aligned}$$

Then, we added self uncertainty, partner uncertainty, relationship uncertainty, and interference from partners as predictors; these variables were evaluated in separate models. Each of these variables was mean centered within respondents, which allowed us to see how deviations around a respondent’s mean score for an independent variable corresponded with changes in the dependent variable. The intercept and the effects for time and intimacy were estimated as random, but the random effects for uncertainty and interference were not significant, so they were estimated as fixed effects in the final analyses. Random effects in the model were allowed to covary. We also included the within-subject means for intimacy, the sources of relational uncertainty, and interference from partners as covariates on the intercept to discern the within-person effect from the between-person effect.<sup>6</sup> The following model reflects the addition of relational uncertainty to the baseline model; an identical model was also tested, which replaced the facets of relational uncertainty with interference from partners.

Model 2: Sources of relational uncertainty and partner's interference as predictors

Level 1 equation:

$$Y_{ij} = \pi_{0j} + \pi_{1j}(\text{time}_{ij} - \overline{\text{time}}_{.j}) + \pi_{2j}(\text{status}_{1j}) + \pi_{3j}(\text{intimacy}_{ij} - \overline{\text{intimacy}}_{.j}) \\ + \pi_{4j}(\text{self uncertainty}_{ij} - \overline{\text{self uncertainty}}_{.j}) + r_{ij}$$

Level 2 equation:

$$\pi_{0j} = \beta_{00} + \beta_{01}(\overline{\text{intimacy}}_{.j}) + \beta_{02}(\overline{\text{self uncertainty}}_{.j}) + u_{0j} \\ \pi_{1j} = \beta_{10} + u_{1j} \\ \pi_{2j} = \beta_{20} \\ \pi_{3j} = \beta_{30} + u_{3j} \\ \pi_{4j} = \beta_{40}$$

Finally, the model that tested the directness of communication as a dependent variable was identical to Model 1 mentioned above, but it also added cognitive and emotional jealousies as predictors. Both cognitive and emotional jealousies were mean centered within respondents so as to measure the effects based on deviations around the within-person mean on those variables. We estimated both cognitive and emotional jealousies as fixed effects. In addition, the within-person mean on these variables was also entered as a covariate on the intercept.

Model 3: Adding cognitive and emotional jealousies as predictors of communicative directness

Level 1 equation:

$$Y_{ij} = \pi_{0j} + \pi_{1j}(\text{time}_{ij} - \overline{\text{time}}_{.j}) + \pi_{2j}(\text{status}_{1j}) + \pi_{3j}(\text{intimacy}_{ij} - \overline{\text{intimacy}}_{.j}) \\ + \pi_{4j}(\text{cognitive jealousy}_{ij} - \overline{\text{cognitive jealousy}}_{.j}) \\ + \pi_{5j}(\text{emotional jealousy}_{ij} - \overline{\text{emotional jealousy}}_{.j}) \\ + \pi_{6j}(\text{self uncertainty}_{ij} - \overline{\text{self uncertainty}}_{.j}) + r_{ij}$$

Level 2 equation:

$$\pi_{0j} = \beta_{00} + \beta_{01}(\overline{\text{intimacy}}_{.j}) + \beta_{02}(\overline{\text{cognitive jealousy}}_{.j}) \\ + \beta_{03}(\overline{\text{emotional jealousy}}_{.j}) + \beta_{04}(\overline{\text{self uncertainty}}_{.j}) + u_{0j} \\ \pi_{1j} = \beta_{10} + u_{1j} \\ \pi_{2j} = \beta_{20} \\ \pi_{3j} = \beta_{30} + u_{3j} \\ \pi_{4j} = \beta_{40} \\ \pi_{5j} = \beta_{50}$$

#### *Hypotheses 7 and 8*

A separate set of analyses tested the prediction that the intensity of jealousy and the directness of communication about those experiences shape subsequent



characteristics of the relationship. To conduct these analyses, we reconfigured the data to include five sets of repeated measures, consisting of pairs of subsequent weeks. Specifically, reactions to relational episodes and communication about those events during Week  $t-1$  were combined with the relationship characteristics for Week  $t$  (where  $t = \text{Weeks } 2-6$ ). In separate analyses, intimacy, the three facets of relational uncertainty, and a partner's interference measured at Week  $t$  served as dependent variables. In each analysis, we controlled for the corresponding relationship characteristic (intimacy, uncertainty, or interference) reported during the previous week ( $t-1$ ). Independent variables included cognitive jealousy, emotional jealousy, and the directness of communication about those events in Week  $t-1$ . All independent variables were entered into the model as uncentered because we were interested in sequences of specific values from one week to the next, rather than the effect of deviations from the mean across weeks. The intercept was estimated as a random effect, and the independent variables were estimated as fixed effects.<sup>7</sup> As a starting point, our baseline model predicted the dependent variable based on its corresponding variable from the previous week, which is represented in the following equations:

Model 1: Baseline model

Level 1 equation:

$$Y_{ij} = \pi_{0j} + \pi_{1j}(Y_{(i-1)j}) + r_{ij}$$

Level 2 equation:

$$\begin{aligned} \pi_{0j} &= \beta_{00} + u_{0j} \\ \pi_{1j} &= \beta_{10} \end{aligned}$$

To test the effect of cognitive and emotional jealousies and the directness of communication about jealousy on subsequent relationship characteristics, we then entered each of those variables in separate models. These predictors were also uncentered and estimated as fixed effects. The following model reflects the addition of cognitive jealousy to the model, but identical models were also created for emotional jealousy and the directness of communication:

Model 2: Cognitive jealousy, emotional jealousy, and communicative directness as predictors

Level 1 equation:

$$Y_{ij} = \pi_{0j} + \pi_{1j}(Y_{(i-1)j}) + \pi_{2j}(\text{cognitive jealousy}_{(i-1)j}) + r_{ij}$$

Level 2 equation:

$$\begin{aligned} \pi_{0j} &= \beta_{00} + u_{0j} \\ \pi_{1j} &= \beta_{10} \\ \pi_{2j} &= \beta_{20} \end{aligned}$$

**Table 3** Associations Between Cognitive and Emotional Jealousies and Relationship Characteristics

	Cognitive Jealousy Models			Emotional Jealousy Models			
	Baseline Model	Self Uncertainty Model	Partner Uncertainty Model	Relationship Interference Model	Partner Uncertainty Model	Self Uncertainty Model	Relationship Interference Model
Intercept	3.57***	2.58***	2.16***	1.83***	3.32***	2.74***	1.89***
Intimacy mean	-.59***	-.26*	-.20	-.10	-.60***	-.00	.26
Self uncertainty mean	.42***		.46***				.35**
Partner uncertainty mean				.63***			
Relationship uncertainty mean					.14*		
Partner interference mean							.42**
Slopes							
Time	.03	.03	.02	.03	.03	-.08***	-.08***
Relationship status	-.29***	-.29***	-.24*	-.25**	-.31***	.15	.16
Intimacy	-.55***	-.52**	-.50**	-.43**	-.57**	.11	.11
Self uncertainty	.06		.13**			.00	.00
Partner uncertainty				.21***			.12**
Relationship uncertainty					.06		.18*
Interference from partners							
Random effects ( $\tau$ )							
Intercept	.86***	.79***	.69***	.65***	.84***	1.45***	1.43***
Time	.02	.02	.02	.02	.02	.04***	.04***
Intimacy	1.22***	1.16***	1.15***	1.09***	1.20**	.18	.18
						.11	.11
							.20

*Note:* Cell entries in the intercept category are the change in the intercept attributable to the within-person mean, which represents the between-person effect on that variable. The cell entries in the slopes category represent the within-person slope over the course of the study. The cell entries in the random effects category are  $\tau$  and represent the remaining unexplained variation in that variable.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

## Results

### Hypotheses 1 and 2

The results provided mixed support for the associations between the facets of the relational turbulence model and the reactions to jealousy (Table 3). The between-person effects on the intercept revealed that increased intimacy in relationships decreased the incidence of cognitive jealousy in the baseline model, self uncertainty model, and partner interference model, and that intimacy increased emotional jealousy in the relationship uncertainty model. In addition, all three facets of relational uncertainty corresponded with increased cognitive and emotional jealousies. Relationships marked by heightened partner interference were also characterized by increased cognitive and emotional jealousies.

The within-person effects were not as consistent (Table 3). Increases in intimacy within a relationship corresponded with decreased cognitive jealousy across all sets of models. Intimacy was not significantly associated with emotional jealousy in any of the models. Consistent with H1, relationship conditions marked by partner uncertainty and relationship uncertainty were associated with more cognitive and emotional jealousies. H2 was also partially supported by these data, such that increases in interference from partners gave rise to more emotional jealousy, but did not show significant increases in cognitive jealousy. Comparisons of model fit indicated that the addition of facets of relational uncertainty, but not interference from partners, significantly improved model fit for cognitive jealousy. With the exception of the model for self uncertainty, the addition of the uncertainty and interference variables improved model fit for emotional jealousy.

### Hypotheses 3–6

The multilevel models evaluating the effects of relational uncertainty and interference from partners on the directness of communication about jealousy are summarized in Table 4. The between-person effects on the intercept revealed that intimacy was positively associated with communicative directness across models. Emotional jealousy was positively associated with communicative directness in all models, except in the model for partner interference. Increased partner uncertainty corresponded with decreased directness. Finally, increased partner interference was associated with more direct communication. Although the significant effects are consistent with our hypotheses, several of the anticipated effects were nonsignificant.

The within-person effects also provided limited support for our hypotheses. Cognitive and emotional jealousies were not significant predictors of communicative directness, so H3 was not supported. Increases in intimacy corresponded with more direct communication about jealousy in each of the models, which supported H4. H5 received partial support, such that relationship uncertainty was negatively associated with the directness of communication about jealousy, but self and partner uncertainty were not significantly associated with directness. H6, which predicted a positive association between a partner's interference and communicative directness,

**Table 4** Associations Between Communicative Directness and Relationship Characteristics

	Cognitive Jealousy Models				
	Baseline Model	Self Uncertainty Model	Partner Uncertainty Model	Relationship Uncertainty Model	Partner Interference Model
Intercept	2.30***	1.74***	2.15***	2.04***	1.14***
Intimacy mean	.77***	.76***	.68***	.70***	.79***
Cognitive jealousy mean	-.05	-.04	.00	-.00	-.06
Emotional jealousy mean	.14*	.14*	.14*	.14*	.11
Self uncertainty mean		-.07			
Partner uncertainty mean			-.17*		
Relationship uncertainty mean				-.15†	
Partner interference mean					.23**
Slopes					
Time	-.02	-.02	-.02	-.02	-.02
Relationship status	.16	.17	.14	.15	.13
Intimacy	.48**	.47**	.45*	.37*	.42*
Cognitive jealousy	-.05	.06	.06	.07	.05
Emotional jealousy	.07	.07	.08	.08	.07
Self uncertainty		.02			
Partner uncertainty			-.03		
Relationship uncertainty				-.16*	
Interference from partners					.06
Random effects ( $\tau$ )					
Intercept	.75***	.78***	.77***	.79***	.74***
Time	.05**	.05**	.05***	.05***	.05***
Intimacy	.15	.19	.13	.16	.16

Note: Cell entries in the intercept category are the change in the intercept attributable to the within-person mean, which represents the between-person effect on that variable. The cell entries in the slopes category represent the within-person slope over the course of the study. The cell entries in the random effects category are  $\tau$  and represent the remaining unexplained variation in that variable.

†  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

was not supported. Comparisons of model fit revealed that the addition of the relational uncertainty and partner interference variables in the models predicting directness of communication did not significantly improve model fit.

**Hypotheses 7 and 8**

Our next set of hypotheses examined the effect of jealousy and communicative directness on relationship characteristics in subsequent weeks. The analysis partially supported H7 and H8. Not surprisingly, the corresponding relationship characteristics from Week  $t-1$  in each model were highly correlated with subsequent intimacy,

relational uncertainty, and interference measured in Week *t* (Table 5). Beyond the effects of the covariates, however, cognitive jealousy at Week *t*-1 was positively associated with partner and relationship uncertainty in the following week. In contrast, emotional jealousy at Week *t*-1 was not significantly associated with any of the relationship characteristics in Week *t*. With regards to communication about jealousy, directness in Week *t*-1 was positively associated with intimacy and negatively associated with all three facets of relational uncertainty in the subsequent week. Comparisons of model fit revealed that the addition of cognitive jealousy as a predictor significantly improved fit for the models predicting intimacy, self uncertainty, and partner's interference.

**Table 5** Associations Between Cognitive Jealousy, Emotional Jealousy, and Communication and Subsequent Relationship Characteristics

	Intimacy	Self Uncertainty	Partner Uncertainty	Relationship Uncertainty	A Partner's Interference
<b>Baseline model</b>					
Intercept	-.70***	1.46***	2.44***	2.57***	.45
<b>Slopes</b>					
Time	.00	.02	.04	.02	-.03
Relationship status	.16***	-.17**	-.32***	-.34**	.11*
<i>t</i> -1 intimacy	.81***				
<i>t</i> -1 self uncertainty		.71***			
<i>t</i> -1 partner uncertainty			.60***		
<i>t</i> -1 relationship uncertainty				.57***	
<i>t</i> -1 partner's interference					.67***
Random effects ( $\tau$ )	.00	.02	.08**	.10***	.03
<b>Cognitive jealousy model</b>					
Intercept	-.62***	1.29***	2.04***	2.34***	.37
Slope	-.02	.04	.14***	.10***	.01
Random effect ( $\tau$ )	.00	.03	.11***	.12***	.04
<b>Emotional jealousy model</b>					
Intercept	-.67***	1.48***	2.36***	2.59***	.41
Slope	-.01	-.00	.03	-.01	.01
Random effect ( $\tau$ )	.00	.02	.07**	.10***	.04
<b>Communicative directness model</b>					
Intercept	-.60***	1.26***	2.09***	2.35***	.72*
Slope	.03*	-.07*	-.08*	-.07*	.04
Random effect ( $\tau$ )	.00	.04	.07**	.10***	.02

*Note:* Measures of the dependent variables at Week *t*-1 were included as covariates in each of the analyses, and their associations with the subsequent dependent variable are the values on the diagonal. The models for cognitive and emotional jealousies and communicative directness reflect the addition of these variables at Week *t*-1 to the model predicting each outcome. In each section of the table, we report the new intercept for that model, the slope for the predictor at Week *t*-1, and the random effect for the model. The slopes for the corresponding relationship variables at Week *t*-1 were virtually identical in each of the models, so we only report them for the baseline model to avoid redundant information in the table.

\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

partner uncertainty, and relationship uncertainty. The addition of communicative directness to the models improved model fit for intimacy, self uncertainty, partner uncertainty, and interference from partners. The addition of emotional jealousy did not significantly improve fit in any of the models.

## Discussion

The goal of this study was to evaluate the links among relationship characteristics, the intensity of jealousy, and the directness of communication about jealousy, as well as the impact of jealousy on subsequent perceptions of relationships. At a general level, our findings address the mutual correspondence between global relationship qualities and features of specific episodes in interpersonal associations. Our results also have implications for research on the relational turbulence model, relationship development, and jealousy. In this section, we discuss the contributions our study makes to these three lines of inquiry, in turn. We then review the strengths and limitations of this investigation.

### Implications for the relational turbulence model

The relational turbulence model positions relational uncertainty and interference from partners as mechanisms that promote more intense reactions to relationship events (Solomon & Knobloch, 2004). Although the theory adopts a developmental perspective that emphasizes how the relationship context both shapes particular experiences and then changes as a function of those experiences, the only direct tests of the relational turbulence model to date are cross-sectional in nature (e.g., Solomon & Knobloch, 2001, 2004). Thus, the longitudinal design used in this investigation constitutes an important extension of research on the relational turbulence model. In this section, we consider how the results of this study inform our thinking about the effects of relational uncertainty and interference from partners on reactions to the specific events in romantic associations.

Although prior research has shown that the three sources of uncertainty are highly correlated and causally related, this study suggests that they are not parallel in their associations with other relationship phenomena. The between-person effects in this study indicated that all three facets of relational uncertainty were positively associated with cognitive and emotional jealousies. The within-person effects, on the other hand, revealed that partner and relationship uncertainty were positively associated with both cognitive and emotional jealousies, but self uncertainty was not significantly associated with either form of jealousy. Perhaps, when people have doubts about their partner's commitment to the relationship, or the viability of the relationship itself, potential rivals are perceived as particularly threatening (Afifi & Reichert, 1996; Bush et al., 1988; Guerrero & Andersen, 1998). In contrast, people who are questioning their own involvement in a relationship might be more ambivalent about their partner's flirtation with a third party. In any case, this study adds to the number of studies that have documented divergence in the roles of self,

partner, and relationship uncertainty within romantic associations (e.g., Knobloch & Donovan-Kicken, 2006; Theiss & Solomon, 2006b).

Our study also revealed differences among the three sources of uncertainty and their associations with communicative directness. Data from the first week of the survey indicated that self, partner, and relationship uncertainty were all negatively correlated with the directness of communication about jealousy, as predicted. In the longitudinal analyses, however, the between-person effects revealed that only partner uncertainty was negatively associated with communicative directness, and in the within-person effects, only relationship uncertainty was significantly associated with communicative directness. Prior research has characterized relationship uncertainty as a product of self and partner uncertainty that links those sources of doubt with reactions to relationship events (e.g., Knobloch & Carpenter-Theune, 2004; Theiss & Solomon, 2006b). Evidence that relationship uncertainty may be the more robust predictor of communicative reactions to jealousy provides another way of conceptualizing the distinctions among the specific sources of relational uncertainty.

The results of this investigation also help us to differentiate the roles of relational uncertainty and interference from partners as mechanisms that underlie relational turbulence. Although the relational turbulence model positions relational uncertainty and a partner's interference as alternative but equivalent forces that promote reactivity to relationship events, our findings imply that a partner's interference may have more specialized effects within romantic associations. In this study, the between-subject effects showed that increases in interference corresponded with increases in cognitive and emotional jealousies and communicative directness. The within-subject effects, however, indicated that interference from partners was only significantly associated with emotional jealousy. Notably, both theory and research emphasize the role of behavioral interruptions in the experience of emotions in close relationships (Berscheid, 1990; Le & Agnew, 2001; Rusbult & Van Lange, 1996). In turn, these emotions may drive people to take action to address the source of the interruption (e.g., Frijda, 1987; Sonnemans & Frijda, 1994). Conversely, the experience of interference from partners appears to be less relevant to cognitive appraisals of relationship events.

Finally, this investigation clarifies the role of intimacy as a factor in relationship experiences and communication. Although some empirical evidence has documented a curvilinear association between intimacy and the intensity of reactions to relationship events that are mediated by relational uncertainty or a partner's interference (e.g., Knobloch & Carpenter-Theune, 2004; Solomon & Knobloch, 2004; Theiss, 2005), intimacy also has direct bearing on experiences in romantic associations (e.g., Theiss & Solomon, 2006b). In this study, data from the first week of the survey revealed significant correlations between intimacy and each of the other variables under investigation. Moreover, the between-person and within-person effects in the multilevel model indicated that increased intimacy corresponds with less cognitive jealousy and more direct communication about jealousy episodes. These patterns cohere with research, linking intimacy to more open communication

about a variety of relationship events (e.g., Knobloch & Carpenter-Thuene; Simon & Gagnon, 1986), including jealousy (Aune & Comstock, 1997). Thus, the results of this study call for revising the relational turbulence model to recognize the independent and substantive effect of intimacy on relationship experiences.

To this point, we have focused our comments on the implications of our findings for the theoretical perspective that was the foundation for this investigation. Of course, research on the relational turbulence model comprises only a small slice of the body of work on the development of interpersonal relationships. In the following section, we broaden the scope of our discussion to consider how this study contributes to research on communication in romantic relationships more generally.

### **Implications for research on communication in romantic relationships**

Our goal in this study was to use longitudinal data and multilevel modeling to examine how within-person fluctuations in perceptions of romantic relationships were associated with cognitive jealousy, emotional jealousy, and the directness of communication about jealousy experiences, and in turn, how jealousy experiences and communication behavior predicted relationship characteristics one week later. The substantial associations between relationship characteristics across weeks highlight the stability of global relationship perceptions over the duration of our longitudinal study. At the same time, we observed that within-person fluctuations in those global characteristics were, at times, significantly associated with concurrent reports of cognitive and emotional jealousies, but less so for communicative directness. In turn, cognitive jealousy and communicative directness (though not emotional jealousy) were significant predictors of relationship characteristics one week later. Thus, this study documents a reciprocal association between one particular experience in romantic associations and global perceptions of intimacy, relational uncertainty, and interference from partners.

Although the results of this study were consistent with a general pattern of reciprocal influence between the relationship characteristics and the experience of romantic jealousy, tests of the impact of jealousy and communicative directness on subsequent relationship characteristics revealed two trends that ran counter to our hypotheses. For one, we observed discrepant effects of cognitive and emotional jealousies on relationship outcomes. After controlling for concurrent relationship characteristics, cognitive jealousy was positively associated with partner and relationship uncertainty; these results are in line with our predictions. In contrast, emotional jealousy was not significantly associated with any of the subsequent relationship features. Although speculative, we wonder if these results point to the different trajectories of cognitive and emotional phenomena within close relationships. Emotions, by definition, are fleeting states that are tied to particular situations and guide behavior to cope with the immediate circumstances (Guerrero & Andersen, 2000). In contrast, cognitive appraisals have the potential to produce lasting reevaluations of relationships (e.g., Baldwin, 1999; Holmes, 2002; Holmes & Cameron, 2005).



As a result, emotional reactions may be more pertinent to immediate behaviors, whereas cognitive reactions leave a more lasting imprint on relationships.

A second point on which the data did not support our hypotheses concerns the effect of communicative directness on subsequent perceptions of interference from partners. We had surmised that direct communication would provide opportunities to manage uncertainty and coordinate behaviors in ways that would foster feelings of closeness (cf. Knobloch & Solomon, 2002a). Consistent with this expectation, the directness of communication about jealousy was positively associated with intimacy and negatively associated with the sources of relational uncertainty one week later. Contrary to our thinking, communicative directness did not significantly improve perceptions of interference from partners in the subsequent week. In developing our hypothesis, we focused on the functional role of direct communication in behavioral coordination. In contrast, politeness theory highlights how direct communication can be constraining because it forces receivers to respond to the message's content (e.g., Brown & Levinson, 1987). Likewise, Baxter and Wilmot (1984) noted how partners often avoid explicit talk about the state of the relationship, because it has the potential to reveal opposing views of the association. To the extent that individuals who communicate directly about their experiences of jealousy provide incontrovertible evidence of partners' goals for a relationship, those interactions may increase perceptions of interference or a lack of symbiosis for the immediate future. Whether a tendency toward more direct communication about goal disruptions leads to more facilitative patterns of exchange in the long run is a question meriting further investigation.

As a final issue, we note the discrepancies between the results generated by the cross-sectional analysis of data from the first week of the survey and the longitudinal multilevel analyses of the full data set. In the bivariate, cross-sectional analyses, intimacy is correlated with each of the dependent variables; in the multilevel results, it only has a significant effect for cognitive jealousy and communicative directness. The correlations indicated substantial positive associations between all three sources of relational uncertainty and cognitive jealousy, but not emotional jealousy; however, the multilevel results showed more modest effects and parallel findings for both sources of jealousy. Whereas the correlations revealed that the directness of communication shared a negative association with cognitive jealousy, but no significant association with emotional jealousy, the multilevel results document a between-person effect for emotional jealousy, but neither facet of jealousy is associated with communicative directness in the within-person effects. Although some of these discrepancies stem from patterns of suppression addressed in the multilevel analyses, they provide insight into the divergent conclusions that might be supported by cross-sectional versus longitudinal evaluations of relationship experiences.

### **Implications for research on romantic jealousy**

As a venue for testing our theoretical assumptions, we examined cognitive, emotional, and communicative responses to jealousy in romantic associations. The

prevailing perspective used to explain the experience of romantic jealousy is attachment theory (e.g., Guerrero, 1998; Radecki-Bush, Farrell, & Bush, 1993; Sharpsteen & Kirkpatrick, 1997). Other scholars have linked the experience of jealousy to relationship development or longevity (Aune et al., 1994; Guerrero & Andersen, 1998; Melamed, 1991) and commitment (e.g., Cann & Baucom, 2004; Rydell, McConnell, & Bringle, 2004). By adopting a relational turbulence model perspective on the experience of jealousy, this investigation points to two directions for developing our understanding of jealousy in romantic associations.

First, we add perceptions of interference from partners to the list of factors that can contribute to more intense feelings of jealousy and directness of communication about those feelings. Specifically, the between-person effects revealed that interference from partners contributes to increased cognitive and emotional jealousies and decreased communicative directness. In contrast, the within-person effects showed that interference from partners was only significantly associated with emotional jealousy. In research on responses to jealousy, uncertainty about the relationship has been highlighted as a force influencing communication strategies (e.g., Afifi & Reichert, 1996). To our knowledge, none of the extant work on jealousy has considered how disruptive patterns of interdependence might intensify emotional jealousy or prompt more direct communication about it. The relational turbulence model suggests that a partner's interference in daily activities creates a reactive environment in which any event can trigger a more extreme response. Alternatively, an individual's vulnerability to a partner's negative influence may be part of a more general pattern of dependence that also renders that person susceptible to a partner's third-party interests. Although our results only point to this pattern consistently in the between-person effects, we are encouraged that the dynamics of behavioral interdependence may shed new light on questions about the experience and management of romantic jealousy over the course of relationship development.

Second, this investigation points to communicative directness in response to jealousy as a factor that shapes relational outcomes. Guerrero et al. (1995) identified six interactive strategies for coping with jealousy, ranging from integrative communication to violence, and five general responses, including indirect strategies like surveillance, manipulation, and contacting the rival. On the one hand, our focus on the directness of communication about jealousy represents a limitation of our study stemming from a need to limit the length of our weekly surveys. On the other hand, our results demonstrate that communicative directness is a parsimonious representation of meaningful variation in responses to jealousy. Certainly, we see the utility in research that has examined predictors of more nuanced responses to romantic jealousy (e.g., Guerrero & Reiter, 1998; Guerrero et al., 1993) and the impact of various communication strategies on relationships (e.g., Andersen, Eloy, Guerrero, & Spitzberg, 1995; Carson & Cupach, 2000). When considering those nuances is neither relevant nor feasible, a focus on the directness of jealousy communication may be sufficient to tap into a consequential aspect of jealousy management.

### Strengths and limitations

In conclusion, we review the strengths and limitations that contextualize our conclusions. Most notably, the longitudinal design of this study marks an important extension of previous research on the relational turbulence model. Prior tests of the model have relied upon cross-sectional designs to assess the interdependence among intimacy, relational uncertainty, and interference from partners (e.g., Knobloch & Solomon, 2004; Solomon & Knobloch, 2001, 2004). These investigations could draw conclusions about the levels of relational uncertainty and interference from partners across relationships with differing levels of intimacy, but they left many questions about the trajectories of intimacy, relational uncertainty, and a partner's interference within a relationship. Thus, this study marks a significant contribution to the growing body of research on the relational turbulence model by examining the associations among these variables over time.

Although we see the longitudinal design of this study as a significant strength, we note that the time frame used to track relationship development may have been too short to measure any substantial relational growth. Notably, the decision to use a six-week time frame was guided in part by prior research that demonstrated significant change in private disclosures between acquaintances during a similar time period (VanLear, 1987). Furthermore, because we used college undergraduates as our sample, we needed to schedule the study around the rhythms of the academic semester. Nevertheless, a longer period of observation may be useful for charting developmental trends. Another strategy might be to sample individuals in less intimate associations, who are likely to experience the greatest change in relationship characteristics over time.

This study is also limited by its focus on one person's perceptions of relationship development. Given that relationships are negotiated and maintained in the interactions between partners (e.g., Masuda & Duck, 2002), the individual perspective represented in this study limits our understanding of relationship development processes. The predominantly female sample also limits the generalizability of our findings. Although we did not find that gender moderated any of the effects in this study, a more balanced sample would provide better insight into these phenomena from both sides of the relationship. Despite these limitations, the methods used in this study offer promising strategies for assessing both partners' perceptions of relationship development. The Web-based survey makes it possible for partners to complete the questionnaire independently and privately and for the data to be matched up for two people in the same dyad. Moreover, one advantage of multilevel modeling is that it can easily account for dependence in a three-level model in which repeated measures are nested in individuals, who are, in turn, nested in couples. Such a design would accomplish the lofty goal of a longitudinal, dyadic assessment of the factors that influence relationship development.

Finally, we note that the effect sizes of interest in this study are small relative to the evidence of stability in relationship characteristics over time. Within-person variance in relationship characteristics across weeks of this study was limited; therefore, our

findings do not point to sweeping changes in the development of intimate relationships. In addition, the strongest predictor of relationship characteristics in a given week was the corresponding relationship characteristic during the previous week. Against this backdrop, responses to jealousy had relatively minimal effects on intimacy, relational uncertainty, and perceptions of interference from partners. What remains to be seen is whether the impact of jealousy and communicative directness is substantial enough to shape the future course of the relationship.

Although the effects we observed are small and tempered by limited variance over the course of the study, we suggest that these incremental changes may have a cumulative effect on relationship development. Consider the analogy of a stone that is tossed into a relatively calm body of water. When the stone hits the surface of the water, it creates a ripple that expands until it reaches the opposite bank. In the movement of that ripple, objects are carried further apart and light is reflected differently off the water's surface. Turbulent relationship events are like stones that are cast into the pond of a developing romantic relationship because they give rise to changes in relationship characteristics that alter the context for the next relational episode. Like the points of light reflected off the ripple in the water, the experience of relational turbulence creates conditions in which events are interpreted differently. Thus, the impact of reactivity on relationship qualities may not necessarily be deterministic, but the cumulative effect of turbulence can have a profound impact on relationship development.

## Notes

- 1 In its entirety, the relational turbulence model specifies that the dynamics of relationship development cause relational uncertainty and interference from partners to peak at moderate levels of intimacy, and relational uncertainty and a partner's interference shape reactions to relationship events. By this logic, intimacy should have a curvilinear association with reactivity that is mediated by relational uncertainty and interference from partners (Solomon & Knobloch, 2004). Empirical research has provided inconsistent results concerning the nature of the associations between intimacy and relational uncertainty, a partner's interference, and reactions to specific issues (see Knobloch & Solomon, 2002b; Solomon & Knobloch, 2001, 2004). Perhaps not surprisingly, then, tests focused on the mediational roles of relational uncertainty and a partner's interference have produced mixed results (Solomon & Knobloch, 2004; Theiss & Solomon, 2006b). Given the need to probe the complex associations among intimacy, relational uncertainty, and a partner's interference in greater detail, we examined that facet of the relational turbulence model in a separate study (see Theiss & Solomon, 2006a).
- 2 Previous research has revealed that relationships marked by moderate levels of intimacy can be characterized by both direct and indirect communication patterns. On the one hand, evidence suggests that partners in moderately intimate associations engage in more topic avoidance (Knobloch & Carpenter-Theune, 2004), make indirect date requests (Solomon, 1997), and withhold more complaints (Cloven & Roloff, 1994). On the other hand, research reveals that moderately intimate partners express more negative

- emotion (Aune et al., 1994), are more verbally aggressive (Billingham & Sack, 1987), and have more arguments (Braiker & Kelley, 1979). In some studies, however, it appears that the nonlinear associations are deviations from an underlying linear association in which directness increases with intimacy (e.g., Cloven & Roloff, 1994; Knobloch & Carpenter-Theune, 2004). This conclusion coheres with the longstanding assumption that increased intimacy corresponds with more open communication (e.g., Altman & Taylor, 1973; Berger & Calabrese, 1975). Based on this logic, we predict a positive linear association between intimacy and directness rather than a curvilinear association.
- 3 We did not want to limit the study to participants who self-identified as being in a romantic situation because those relationships are already well established and have successfully negotiated periods of moderate intimacy in which turbulence is likely to be most intense (Solomon & Knobloch, 2004). In acquaintance relationships or friendships, individuals who perceive a romantic connection with their partner are yet to establish mutual commitment to a dating relationship. Hence, these types of relationships are important to include in a test of the relational turbulence model because they have the most potential for relationship development over the course of the study. Individuals who were not in a relationship characterized by romantic interest were offered an alternative task that earned the same amount of extra credit.
  - 4 Whereas previous studies have examined communicative responses to jealousy in more nuanced ways (see Guerrero et al., 1995), our focus was on the directness of communicative responses. Although direct and indirect communication can take many forms, we were reluctant to include an elaborate measure of communicative directness in what was already a lengthy weekly survey. Thus, we opted for a brief measure of directness in an effort to simplify the questionnaire and to avoid respondent fatigue from week to week.
  - 5 The relational turbulence model assumes that intimacy has a curvilinear association with reactivity. Although empirical research is mixed on this point, we included the quadratic term to evaluate the potential curvilinear association between intimacy and jealousy and communicative directness. Results indicated that none of the dependent variables shared a curvilinear association with intimacy, so the quadratic term was not included in the final models for the sake of parsimony.
  - 6 We also tested the interactions between intimacy and baseline relationship status and between time and baseline relationship status. Neither the fixed nor the random effects of these interactions were significant, so they were excluded from the final models for the sake of parsimony.
  - 7 We also evaluated the interaction between cognitive or emotional jealousy and the directness of communication about jealousy. Results revealed no significant interactions; thus, we focused on the unconditional effects of jealousy and communicative directness specified in the hypotheses.

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